

Till Mr. Michael traced the life-histories of these creatures, the immature stages of eight species only were known to us. Nicolet, indeed, gives eleven, but as to three he is, in Mr. Michael's opinion, certainly in error. In all other species the life-history when known has been traced by Mr. Michael himself.

In breeding Mr. Michael used glass cells "composed of ordinary microscopical glass slips 3×1 inch, having in the centre, fastened by marine glue or Canada balsam, a glass ring made of a transverse slice of glass tubing about $\frac{3}{8}$ or $\frac{7}{8}$ inch in diameter, the length of the tube, and consequently the depth of the cells, being usually about $\frac{3}{8}$ inch. The tubing I employ is of tolerably thin glass, if very thick it is opaque, and leaves little room inside the cell. Over this a thin glass cover, rather larger than the diameter of the tubing, was laid, either a circle or a square; the latter is often handy, as the projecting corners are convenient to take it on or off by, or sometimes a second slide or a broken piece of one is more serviceable. This cover was always quite loose, and simply held on by an ordinary brass-wire microscopical spring-clip; of course the upper edge of the slice of glass tube required to be smooth, so that the cover would lie flat upon it, and not allow the minute prisoners to escape. A cell so prepared was carefully cleaned out, and examined under the microscope, to see that it did not contain Acarina or ova. A small piece of thick white blotting-paper, not large enough to cover the whole bottom of the cell, was then placed in it and damped; a piece or two of growing moss or fungus was then placed in the cell, having first been carefully examined under the microscope to see that it also was free from Acarina and ova, and the cell was then ready for use. One or two specimens of the larva, nymph, or species to be observed, were placed in the cell, never so many but what I knew each individual specimen; the cover was put on, fixed with the clip; a label with a statement of what was inside affixed to the slip, and the whole put away in the dark or very dull light."

Another good mode of providing the fungus-eating species with food Mr. Michael found to be by putting a minute piece of mouldy cheese in the cell; this soon bore a fine crop, which was highly appreciated. He found these simple cells answer better than any more elaborate apparatus. Mr. Macintyre's ingenious cork cells, so useful for many small insects, are not suitable for Oribatidæ, in the first place because many are wood-borers, and even those which are not often get lost in the interspaces of the cork. He also found that these cells got dry more rapidly.

He tells us indeed (and having had some experience in similar observations I doubt not that it is so) that no portion of his work has been either more laborious or more interesting than that of tracing the life-histories of the different species through their immature stages. The creatures are minute, scarcely visible indeed to the naked eye, they avoid the light and always endeavour to hide themselves, and yet they must be frequently examined to see what is going on. They must not be touched with any hard instrument, and lastly their transformations last for many months, sometimes for more than a year.

It is obvious indeed that his observations required great and constant care. The hygrometric condition of the cell required continued watching, since if it were made too

damp or allowed to get too dry, even for an hour, the labour of months would be lost. Mr. Michael carried his mites about with him on any journey, but it is obvious that alone he would have been wholly unable to devote sufficient time to the care of them, and it was, he tells us, mainly to his wife's patient attention and skilled fingers that his success in rearing them was due. To Mrs. Michael then, as well as to her husband, we will tender our warm thanks and congratulations on this excellent contribution to the natural history of the British Isles.

JOHN LUBBOCK

INJURIOUS INSECTS

Reports of Observations of Injurious Insects and Common Crop Pests during the Year 1883; with Methods of Preservation and Remedy. By Eleanor A. Ormerod, F.R.Met.Soc., &c. Pp. 1-80 and 1-16. (London: Simpkin, Marshall, and Co., 1884.)

WE have to congratulate Miss Ormerod on having again produced an excellent summary of the evil doings of injurious insects in this country during the past year. It is full of interesting and useful information, from personal observation, and from the reports sent in by the staff of assistants she has enlisted into her service. Regarded from a popular point of view these annual Reports do great service by explaining to those interested the real nature of their insect foes; from a scientific point of view they may do good service by stimulating inquiry, and occasionally bringing to light the hitherto unknown life-histories of certain species; and they should do paramount service from an economical point of view. This latter is really the most important of all, and the item of *expense* in application of remedies is always a serious consideration. With some crops it may sometimes be doubtful if the outlay would be sufficiently recouped; with others (hops for example) the case is different. In that year of hop-famine, 1882, we heard of one grower who expended 15*l.* an acre on washing, and was amply and abundantly repaid, but if all had done the same his profit would have been much less, though the general advantage would have been much greater: possibly in his case his gardens were comparatively isolated, and not subject to migrations from those of less careful neighbours. While on this point we observe that Miss Ormerod is inclined to believe in the supposed migration of the hop-aphis from plum to hop. The habit of migration in *Aphides* from one plant to another totally different is most strongly asserted by Lichtenstein, and almost as strongly pooh-poohed by others. At present we incline to the side of the observant French *savant*, because he states results from actual observation and experiment, whereas his opponents simply deny the possibility.

On one point we do not think Miss Ormerod has proved her case. She inclines to the belief that Myriopods ("False wire-worms" as she terms them) are "pests," and do devour healthy vegetable growth; nothing is impossible, but more proof than that given will be required in order to convince those who hold a contrary opinion.

That much vexed sparrow question is touched upon, not in a manner favourable to the sparrow. It is really a vexed question, and we fear will remain so. In the

writer's garden the sparrows are at this moment doing their best to clear the rose-trees of the "green-fly" that infest them, and there can be no doubt that at this season the sparrow is almost entirely insectivorous; at other seasons it is almost equally granivorous; possibly a judicious thinning of sparrows may be salutary, but those who advocate wholesale slaughter should bear in mind the results of the indiscriminate destruction of raptorial birds in these islands.

Miss Ormerod is not always happy in her nomenclature. Excepting in one book there is no such thing known as "*Hybernia prosapiaria*" (p. 5), the specific appellation rightly belonging to an entirely different insect; moreover had she consulted any recent work or list on *Micro-Lepidoptera* she would not have penned the footnote that appears at p. 67.

The illustrations (even if most of them be old and familiar) are good, and add to the usefulness of the Report.

In future Reports we think it deserves Miss Ormerod's consideration whether a meteorological summary in tabular form would not prove a useful addition, compiled especially with regard to the comparative abundance or scarcity of particular injurious species in former years, in connection with the temperature and rainfall in every month of each year.

R. McL.

OUR BOOK SHELF

An Elementary Treatise on the Integral Calculus, containing Applications to Plane Curves and Surfaces; with Numerous Examples. By B. Williamson, F.R.S. (London: Longmans, 1884.)

A WORK by Mr. Williamson is like good wine, and needs no commendation from us. We note that this has reached a fourth edition, but Mr. Williamson does not rest content with what he has already achieved. He has given a touch here, brought out into greater prominence a feature there, and not only so, but he has at last added a new detail in the shape of a chapter on multiple integration. In our notices of former editions we have drawn attention to the absence of such a chapter, and we are glad to see that he has at last introduced what he hopes "will be found a useful addition to the book." We need only remark further that this edition has 393 pages against 375 pages in the third edition.

An Elementary Treatise on Solid Geometry. By Charles Smith, M.A. (London: Macmillan and Co., 1884.)

MR. SMITH has already won his spurs as a mathematical writer by his admirable "Conics." This work, as far as possible, is on the same lines. It is not intended to supersede the classic treatises by Salmon and Frost any more than his former book was to take the place of the splendid work on "Conics" by the former of the above-named writers. A feature in Mr. Smith's treatment of the subject is the early discussion of the different surfaces which can be represented by the general equation of the second degree; and in the way in which these surfaces are here handled we think the student will be much interested. The discussion is full and very clear. An excellent collection of exercises adds much to the value of the book for students: those in the body of the chapters being well fitted to bring the text home to the reader. For the majority of students we should say, "Read Smith's 'Solid Geometry,' and you will not need any other work." Those who wish to penetrate into the inmost recesses will find that they have been helped by the study of this work

to attack the masterpieces referred to at the outset of our notice.

A Collection of Examples on the Analytic Geometry of Plane Conics; to which are added some Examples on Sphero-Conics. By R. A. Roberts, M.A. (Dublin University Press Series, 1884.)

WE had the pleasure of noticing with commendation (NATURE, vol. xxvi. p. 197) a previous collection of examples by Mr. Roberts on conics and some of the higher plane curves. This has all the merits of the former work, with, we fancy, increased power and skill in the methods employed. A portion of the exercises is common to both works. Much space is devoted to the discussion of properties of circles connected with a conic, especially of circles having double contact with the curve. Great use is here made, and effectively, of elliptic coordinates. "This method simplifies greatly the study of relations involving the angles of intersection of such systems," i.e. as have double contact with two fixed confocal conics, "whose differential equations take a simple form." In all there are fifteen chapters, the last of which treats of sphero-conics; in this chapter also much use is made of elliptic coordinates. The collection is likely to be very serviceable to junior students, and will be convenient for reference generally. After perusal we have not detected, we believe, any errata that will cause such students as can use the book with profit any trouble.

Mineralogy. Vol. II. Systematic and Descriptive. By J. H. Collins, F.G.S. (Collins's Advanced Science Series.) (London and Glasgow: W. Collins, Sons, and Co., 1883.)

THIS little book is not, neither does it profess to be, more than a dictionary of minerals. The names, localities, and general characters are given as briefly as possible; and the work seems to be brought up to latest date.

The only point in which the author lays claim to originality of treatment is the classification, and it is precisely here that exception may be taken to the book, with its system of Pyritoids, Spathoids, Haloids, Plethoids, Brithoids, &c., and partial neglect of isomorphous groups. Cerussite, for example, is grouped with phosgenite instead of with aragonite, witherite, &c.

There are a number of crystal figures, but the notations, where used, are not consistent; and in one case, where the cleavages of barytes are wrongly described, the notation is meaningless.

There are several typographical and other errors which should be corrected in a second edition—e.g. "Senaviza" (p. 61) should be "Serravezza"; feather-ore (p. 60) should be referred to jamesonite, and not to berthierite; "eulitite" (p. 239) should be "eulytite."

It can scarcely be expected that the book will be much used by the "practical miners, quarrymen, and field-geologists" for whom it is intended. The other readers for whom the author writes, "students of the science classes," may however find it a useful and compendious book of reference, as containing a very complete list of minerals.

Handbook of Vertebrate Dissection. Part III. "How to Dissect a Rodent." By H. Newell Martin, D.Sc., M.D., M.A., and William A. Moale, M.D. (New York: Macmillan and Co., 1884.)

IN the third of their series of Handbooks of Vertebrate Dissection, Drs. Martin and Moale describe a mammal, taking as a type the common rat.

In spite of the authors' remark in the preface that "he who aspires to become a comparative anatomist, and yet finds a rat too small for the observation of all the main facts in its structure, has mistaken his vocation," we think that, for beginners, a larger mammal would have been preferable—at any rate for those who do not aspire to